CURRICULUM
QC
31
A315
1951
CURRGDHT

ALTA
530
1951
Gr10
CURR

DEPARTMENT OF EDUCATION
ALBERTA

No.

Program of Studies for the ~~Junior~~ Senior High School

PHYSICAL SCIENCE 10
(Experimental Course)

Prepared and issued by the Curriculum
Branch of the Department of Education,
Alberta

September, 1951

CURRICULUM
EDUCATION LIBRARY

Digitized by the Internet Archive
in 2012 with funding from
University of Alberta Libraries

http://archive.org/details/physicalscience1051albe

PHYSICAL SCIENCE 10 - EXPERIMENTAL COURSE

UNIT 1

THE NATURE OF THINGS

> "Things are not always what they seem to be. In Science, seeing is not believing, for many things occur which are invisible to the eye, though detectable by instruments."

> "The physical world and the changes occurring in it must first be described and carefully measured, and the immediate environment closely explored, to prevent false deductions."

1. Objectives of this Unit

(a) To develop a critical attitude in examining things, and an appreciation of the significance of the molecular theory to our understanding of the physical world.

(b) To develop the ability to observe materials, record data, and make accurate deductions with respect to the nature of matter.

(c) To acquire a knowledge of the distinguishing charateristics of elements, compounds and mixtures, and of the special properties of air and water.

2. Suggested Approach

The details and the important generalizations contained in this unit are vital to the study of science. Abundant opportunities are provided for student activities through experimentation, and by the use of demonstrations. This practical approach, when combined with the theoretical treatment necessary to clarify deductions, relate facts and establish generalizations, should permit the profitable development of the purposes as listed above. The selection of procedures, and the balancing of various procedures to achieve the specific objectives sought, are important. No amount of theoretical discussion alone will substitute for the direct observations of such phenomena as Brownian movement.

3. References:

1. Hogg, et al - Ch's. 3, 4, 5, 6, 7.
2. Cheronis, et al - see index.
3. Dull - Ch's. 1, 2, 3, 4.

UNIT 1. - The Nature of Things

Specific Purposes	Suggested Procedures	Understandings
1. To identify, and recognize the properties of matter in each of its three states.	a. Examine a variety of specimens of matter. b. Make a list of many materials, and group them into solids, liquids, gases.	a. There are three states of matter - solids, liquids and gases. b. All forms of matter have certain properties in common.
2. To distinguish between mixtures and pure substances.	a. Examine more closely the specimens above, and divide them into mixtures and pure substances. b. Separate one or more mixtures into their constituents.	a. Most solids, liquids and gases are mixtures; the rest are pure substances. b. Mixtures may be separated into their constituents by a mechanical process.
3. To understand the meanings of the terms Elements and Compounds.	a. Examine a number of pure substances with a view to distinguishing between elements and compounds. b. Study the use of these terms by early philosophers and scientists. c. Make a compound from its elements. d. Decompose a compound into elements.	a Compounds are not distinguished easily from elements. b. An element is a substance that cannot be decomposed by chemical treatment. c. There are about one hundred different elements, several thousand different compounds, and an unlimited number of mixtures of these. d. Heat and electricity are two chief agents used to decompose compounds or unite elements.

4. To establish our present theory of the structure of matter.	a. Study solution and evaporation to demonstrate the spaces between molecules. b. Study illustrations and diagrams of molecules and atoms. c. Compare the properties of a compound with the characteristic properties of its elements.	a. Matter is composed of molecules with spaces between them. b. A molecule consists of one or more atoms. c. Atoms are the units of elements; molecules are the units of compounds. d. Molecules and atoms each have specific characteristic properties. e. The atom consists of a nucleus and planetary electrons.
5. To develop a realization of the significance of molecular motion in relation to the properties of matter.	a. Study the processes of solution and diffusion to demonstrate molecular motion. b. Illustrate molecular motion by reference to the Brownian movement. c. Demonstrate cohesion and adhesion.	a. All molecules move. b. The state of any substance is related to the speed of its molecules. c. The higher the temperature the farther the molecules move. d. Evaporation, diffusion, processes of solution, and gaseous pressure are related to molecular motion. e. Cohesion and adhesion are forms which determine the degree of freedom of motion or molecules.

UNIT 1 Cont'd

6. To acquire accurate knowledge of an important mixture – air,	a. Demonstrate that air has weight and exerts pressures. b. Construct a simple mercury barometer, and note variations with respect to altitude and weather changes. c. Find proportions of the constituents of air. d. Remove oxygen from air and note the properties of the residual gases.	a. Air has weight and exerts pressures b. Air pressure can be measured by means of barometers, c. Air pressure varies with changes in altitude and weather conditions, d. Air contains several gases mixed in a relatively uniform proportion, e. The chemically active part of air is oxygen; the inactive part is mostly nitrogen,
7. To acquire accurate knowledge of air's important compound – water.	a. Study the use of water in Alberta for irrigation, power, industry, sanitation. b. Investigate the problems of water supply and conservation in Alberta. c. By investigation and experiment, study how natural water may be prepared for man's use. d. By electrolysis, show that water is a compound,	a. Water is an important natural resource and should be conserved, b. Water is the most common solvent c. Natural water contains many substances in solution which affects its uses. d. Water can be decomposed by electricity into hydrogen and oxygen,

8 To develop a realization of the importance of water and air in relation to work.	a. Demonstrate the laws of liquid pressure. b. Demonstrate Pascal's Principle of the transmission of fluid pressure. e. Demonstrate Archimedes' Principle and the principle of flotation. d Study several applications of the above principles. e. Study how man coverts the energy of moving air and water into work.	a Because of its weight, water exerts pressure. b. Water may be used to transmit pressure. c. Buoyancy is an important characteristic of both water and air. d. The kinetic energy of water and air may be used by man to do work.

UNIT 2 — THE EARTH

Specific Purposes	Suggested Procedures	Understandings
1. To ascertain how the Earth's shape, position, and movements are used by man to indicate time and location.	a. Use suitable equipment and diagrams to study the shape and motions of the earth. b. Make observations of the angle of the slope of the sun's rays in relation to seasonal changes. c. Using a globe, review latitude and longitude. d. Study exquinoxes and summer and winter solstices. e. Study the development of our present day calendar and its proposed reforms.	a. The Earth is a spherical-shaped planet, slightly flattened at the poles. b. The average period of rotation of the earth upon its axis is called a solar day. c. It moves in its orbit around the sun in 365 1/4 days. d. The Earth's axis being inclined, it orbital motion gives rise to seasons. e. Man has devised lines of reference called Latitude and Longitude, a means of locating points on the earth's surface. f. Man also uses lines of Longitude to indicate time belts.
2. To visualize the earth's interior as established by research and deduction.	a. Gather evidence concerning the nature of the interior of the earth -- hot springs, well-drilling, meteors. b. Gather information and report on famous volcanoes, and the history of their eruptions. c. Utilize charts, diagrams, and pictures to study the nature and causes of volcanoes and earthquakes.	a. The earth consists of a solid crust over plastic rock, with an iron nickel core at its center. b. The temperature of the earth increases with depth - 1°F. for each 100 feet. c. The high temperature at the interior of the earth does not melt rocks because of the overlying pressure. d. When the pressure is released, molten rock flows out. e. When the lava in a volcano solidifies, the resulting build-up in pressure beneath may cause an eruption.

3. To become acquainted with the main types of rocks.	a. Acquire a large collection of rocks for study and classification.	a. Igneous rocks were once molten - e.g. basalt, granite. b. Sedimentary rocks are usually deposited in water - e.g. limestone, shale. c. Some sedimentary rocks are organic in origin - e.g. coral, coal. d. Metamorphic rocks result from other types of rocks being under heat and pressure - e.g. slate, marble, anthracite.
4 To appreciate the significance to man of the continuous changes in the earth's surface.	a. Observe and record how the agents of erosion have moved rock materials locally. b. Gather information on all agents of erosion which cannot be directly observed. c. Study the effect of acid on limestone, water, or iron, and other similar reactions, and relate to chemical weathering. d. A study of conditions which might cause Alberta to become a "Dust Bowl", and of the steps being taken to avoid it.	a. Erosion is the transporting and re-depositing of rock material. b. Weathering may be either mechanical or chemical. c. Agents of erosion are wind, running water, glaciers, waves. d. Chemical action produces soils and give rise to such forms as stalactites and stalagmites. e. Alberta farmers practice various methods of soil conservation.

5. To realize how the Earth's history may be read from the Earth's rocky crust.	a. Through observation of excavations, gravel pits, cuts, etc., note stratification. b. Experiment to show sedimentation, using samples of soil suspended in water. c. Gather information, preferably from student observation, of faults, folding and uncomformities.	a. The sedimentary rocks -- gravel, sand, and mud, have been sorted by water and laid down in strata. b. Younger beds of strata rest upon older beds, and thus age can be determined. c. Earth movements cause faults and unconformormities. d. Key fossils help in determining the ages of rocks.
6. To appreciate the age of the earth through a study of geological eras and related life forms.	a. Examine any available samples of fossils, and obtain literature on fossils in Alberta. b. By use of charts, oral and written reports and discussions, thoroughly familiarlize students with main geological eras and their characteristics. c. Establish the significance of knowledge about geological eras with respect to oil exploration in Alberta.	a. The five main geological eras are named according to the type of life that existed in each period of time named. b. Mountain building and erosion took place in all eras. c. Each era had its dominant form of life d. Fossils first appeared in the Paleozoic since previous forms of life had no skeletons. e. Alberta formations contain a wealth of information concerning the Reptilian or Mesozoic period. f. Remains of man are found only in the latter part of the most recent period - the Cenozoic era. g. Our era - the Cenozic - has been characterized by four "great ice ages"

UNIT 3 - HEAT

Specific Purposes	Suggested Procedures	Understandings
1. To develop a realization that man uses heat from many sources.	a. Demonstrate that heat can be obtained from many sources. b. Trace various sources of heat to the sun, by way of review. c. Study the various methods of producing heat and compare them as to their relative usefulness.	a. Man is dependent on heat for warmth, food, energy. b. The sun is the chief source of heat for the earth. c. Sources of heat that can be controlled are essential to man to meet his special needs. d. These sources are combustion and electricity.
2. To differentiate clearly between "heat" and "temperature".	a. Study the various types of thermometers and the two common thermometer scales. b. Compare temperatures and heat in various bodies to make clear the meaning of each. c. Learn to calculate the amount of heat lost or gained with changes in temperature of a given body of water, and to express the amounts in units of measurement. d. Relate previous study of molecular motion to the explanation of heat and temperature. e. Practice converting "C" readings to "F" readings and vice versa.	a. Heat is the total kinetic energy of the moving molecules of a body. b. Temperature is the degree or intensity of heat of a substance. It depends upon the average kinetic energy of the molecules. c. The amount of heat in a body depends upon its mass, temperature, and the nature of the material. d. For special purposes, special thermometers are used.

3 To understand the various phenomena of heat transferance that enable man to utilize heat.	a. Demonstrate conduction of heat in different substances. b. Illustrate and study convection currents in liquids and gases.(air). c. Study absorption and radiation of heat. d. Study the application of these facts to various practical problems, such as heating systems, and clothing design.	a Heat travels by convection, conduction, and radiation. b. In conduction, energy is transmitted from molecule to molecule; in convection, the molecules of fluids move from place to place carrying the heat engine. Radiation is electromagnetic waves. c. Some substances are good conductors of heat; other are poor conductors or good insulators. d. Man uses his knowledge of heat transfer to provide more comfortable living. c. Convection currents in air and water account for winds and ocean currents.

4. To associate expansion and contraction with many mechanical devices, natural phenomena, and problems in engineering.	a. Investigate to find whether substances expand when heated and contract when cooled. b. Find and study applications of expansion and contraction to practical uses and problems, e.g. steel bridges, thermostats, etc. c. Explain expansion and contraction in terms of molecular motion.	a. Changes in the temperature of substances result in expansion or contraction. b. Gases expand more than liquids and solids when heated, and all gases behave alike. c. Liquids expand more than solids, but different liquids and solids have different coefficients of expansion. d. When gases are compressed the temperature rises; when they are allowed to expand the temperature falls.
5. To develop a realization that the ease with which water may be converted into the gaseous state affects man's comfort and convenience.	a. By demonstrations, if possible, study the difference in conditions of molecules in steam and water. b. Determine the temperature at which water and other liquids boil. c. Study the principle of the pressure cooker and the vacuum pan. d. Study the concept of latent heat and its application to steam heating and refrigeration.	a. The difference in the rates of movement of molecules determines whether water is a gas, liquid, or solid. b. The changes of state of water from solid to liquid, and liquid to vapor, require additional energy. c. The temperature at which water boils depends upon external pressure

UNIT 4 - WEATHER

Specific Purposes	Suggested Procedures	Understandings
1 To develop an appreciation of how weather affects man's activities	a. Make a list of activities of man affected by weather. b. Discuss the affect of weather upon specific occupations. c. Investigate man's attempts to control weather, e.g. smudge-pots, cloud-seeding.	a. Weather affects man's comfort, travel, and occupation. b. Weather affects some occupations more seriously than others. c. Man has had little success in controlling weather.
2. To encourage an interest in recording weather conditions.	a. Study weather reports and records concerning Alberta. b. Recall and record observations made by pupils of weather.	a. Alberta has characteristic weather conditions. b. A knowledge of Alberta weather records assists us in planning activities, e.g. stampedes, carnivals.
3. To understand that the movements of earth's atmosphere are significant to weather and climate.	a. Study a cross-section of the earth's atmosphere in relation to temperatures, moisture content, etc. b. Study movements of the earth's atmosphere caused by unequal heating and the earth's rotation. c. Locate Alberta's position in the wind-belts of the earth at different seasons.	a. Climate is "average" weather over a long period of time. b. Key factors in causing weather conditions are convection currents in the atmosphere and the movemen of air masses. c. The "prevailing westerlies" which influence Alberta's weather, result from convection currents and the direction of the earth's rotation. d. The invasion by air masses is another dominant factor in weather conditions.

4. To develop skill in reading the "weather messages" carried by the clouds.	a. Review evaporation and condensation. b. Find the dew-point in the classroom and discuss relative humidity. c. Observe and record cloud formations over a period of time. d. Study classifications and forms of clouds	a. Evaporation and condensation occur in the troposphere. b. A dew-point exists for one mass of moist air. c. Condensed atmospheric water vapor produces clouds. e. Clouds are classified according to altitude.
5. To develop an appreciation of the importance of air-mass invasion to the weather of Alberta.	a. Study the natures and causes of air masses, cold and warm fronts, cyclones and anti-cyclones. b. Observe and discuss the formation of cold and warm fronts. c. Study weather maps for interpretation of air mass movement.	a. Polar air mass invasions dominate Alberta weather. b. Cold and warm fronts are produced when air masses move into regions of different temperature. c. Cyclones and anticyclones move across Alberta in succession, bringing characteristic changes.

6. To develop an appreciation of the importance of special weather features in a locality.	a. Recall temperature changes caused by compression, and apply to chinook winds. b. Learn the story of a hail-storm. c. Study the origin and characteristics of Alberta blizzards. d. Note the effects of these special weather conditions upon the economy of Alberta.	a. The chinook wind has a great effect on the weather of some Alberta localities. b. Hail storms seriously affect farmers in parts of Alberta. c. Blizzards in Alberta constitute a serious hazard.
7. To develop a scientific attitude toward weather forecasting	a. Find out how information is gathered by weather forecasting. b. Study various weather instruments - barometer, maximum-minimum thermometers, etc., and obtain reports upon local meteorological recording agencies. c. Record weather forecasts from radio and newspaper, and compare against actual conditions. d. Make a collection of weather sayings and discuss their validity as a basis for forecasting - e.g. groundhog, moon, skies, etc. e. Study the symbols used on weather maps and methods of forecasting.	a. Weather forecasting is a science. b. Information is gathered by the use of special instruments. c. Weather information from wide areas is transmitted to central points. d. By the use of special symbols, weather information is recorded on maps daily. e. Specially-trained scientists make forecasts from these maps. f. Continuously changing conditions introduce error and impose a time limit for validity of forecasts.

UNIT 5 - FIRE AND FUELS

Specific Purposes	Suggested Procedures	Understandings
1. To investigate the nature of ordinary combustion.	a. Observe common examples of combustion and record, with a view to attempt explanations of phenomena. b. Study slow combustion - rusting, respiration, oily rags. Record common factors and discuss kindling temperature.	a. Air, and its component, oxygen, are are necessary to combustion. b. Heat, light, smoke, ashes are characteristic of a rapid combustion. c. Slow combustion requires oxygen. d. All combustible materials have a minimum temperature to which they must be heated before they take fire. This is called the ignition point.
2. To develop an appreciation of Lavoisier's use of the Scientific Method in his explanation of burning.	a. Inquire briefly into the attempts of early scientists to explain combustion - the Phlogiston Theory. b. Study Lavoisier's and Priestley's classical experiments with mercuric oxide. c. Perform experiments to indicate the nature of oxides, and to illustrate direct combination of elements to form compounds.	a. The erroneous theory - the Phlogiston Theory - fail to account for the role of oxygen in combustion. b. Substances may gain in weight as a result of combustion, although they may appear less, because of loss of gaseous products. c. Lavoisier, by accurate weighing and experimentation, demonstrated the vital role of oxygen in combustion. d. An oxide is a compound of an element and oxygen. e. In a chemical change, new subtances may be formed, and heat and light may evolve.

3. To appreciate the importance of the special properties of pure oxygen.	a. Study experimentally the properties of pure oxygen.	a. Oxygen may be obtained from many of its compounds. b. Potassium chlorate readily yields oxygen when heated, especially in the presence of manganese dioxide. c. Substances burn much more brightly in oxygen.
4. To develop an appreciation of the fact that hydrogen always forms water when it burns.	a. Study experimentally the preparation and properties of pure hydrogen. b. Study the combustion of some hydrocarbons, such as paraffin or natural gas.	a. Hydrogen can be readily liberated from acids by reaction with metals such as zinc. b. Hydrogen burns, but does not support combustion. It forms an explosive mixture with air. c. The combustion of hydrogen is represented by the equation $2H_2+O_2 \rightarrow 2H_2O$. d. The products of the complete combustion of a hydrocarbon are CO_2 and H_2O. e. The color of the flame is an indication of the completeness of combustion and the temperatures obtained.

5. To realize the need for care in the handling of combustible and explosive materials.	a. Study the chemistry of matches. b. Gather information about fires caused by dust and gas explosions, and the use of the Davy safety lamp. c. Study simple chemical equations illustrating that gases result from explosions. d. Study the chemistry of the internal combustion engine, and its exhaust gases. e. Study the composition and uses of some explosives.	a. Most matches contain phosphorus which has a low ignition point, and is readily ignited by friction. b. Combustible materials in the form of a fine dust or gas form explosive mixtures with air. c. The force of an explosion is caused by the sudden expansion of the gaseous products. d. Properly controlled explosions are useful to man as a source of energy.
6. To understand the chemistry of fire control.	a. Perform simple experiments to illustrate the principle involved in extinguishing of fire. b. Study the chemical reactions involved in the operation of various fire extinguishers.	a. To extinguish a fire the combustible material must be cooled below its kindling point, or the air excluded. b. Certain fire extinguishers utilize specific chemicals to form and eject substances which extinguish fires.

7. To provide an insight into the importance of oil as a fuel.	a. Study the geological aspects of oil formation in Alberta. b. From pamphlets and books, find out how oil is located and extracted. c. Locate the oil and gas fields, refining centers, and pipelines of Alberta. d. Study the processes of fractional distillation and cracking, and the manufacture of synthetic gasoline. e. Discuss some uses of the products of Alberta oil fields.	a. The two essential geological conditions for the formation of oil are a source bed and a trap. b. Oil is probably formed by the decomposition of fish or diatoms. c. The constituents of crude petroleum-gasoline, kerosene, etc., may be separated by fractional distillation. d. Gasoline is a mixture of the lower hydrocarbons. e. Alberta is one of the most important oil producing areas of the world.
8. To develop appreciation of the value of coal as source of energy for man.	a. Review geological aspects of coal formations. b. Collect samples of different forms of coal and experiment with distillation. c. Have pupils report on methods of coal mining in Alberta d. Make charts showing the by-products of coal.	a. Coal was formed millions of years ago from plant materials. b. Successive changes convert vegetation into peat, lignite, bituminous coal, and anthracite. c. Destructive distillation of bituminous coal produces coke, tar and coal gas. d. Coal tar is the source of many important chemical substances. e. Alberta has unlimited deposits of coal.

9. To realize that the use of gas as a fuel affects our daily living in many ways.	a. Study the production and purification of various fuel gases. b. Make a special study of natural gas development in Alberta. c. Prepare and burn acetylene.	a. Coal gas and natural gas have the highest heat values of the fuel gases and consist chiefly of methane and hydrogen. b. Water gas is cheap and is used extensively in industry. It contains a high percentage of carbon monoxide. c. Alberta natural gas is vital source of fuel. d. By varying the proportions of an oxygen-acetylene mixture, flames of different temperatures can be obtained, which are useful in metal work.
10. To appreciate the fact that photosynthesis and combustion are complementary processes in nature.	a. Study exhaled air to show that respiration is an oxidation process. b. Study photosynthesis and its relation to chlorophyll in the green leaf. c. Chart the carbon dioxide cycle.	a. Combustion and respiration tend to increase the carbon dioxide content of air; photosynthesis and solubility in water tend to reduce it. b. Respiration involves the combustion of carbohydrates produced in plants by photosynthesis.

UNIT 6 - MACHINES AND ENGINES

Specific Purposes	Suggested Procedures	Understandings
1. To contemplate early man's problems, and to appreciate his attempts to overcome them through the invention and use of machines.	a. Read, report upon, and discuss early man's discovery and use of machines.	a. Man's limited physical strength curtailed his plans and achievements. b. Early man devised various machines to overcome problems. c. Using a variety of simple machines, man accomplished phenomenal tasks.
2. To observe and be able to recognize various types of machines.	a. Gather into the laboratory for examination, appropriate examples of machines which can be analysed into the six simple types of machines. b. Trace the adaptation of these six simple machines as they exist in more complex machinery.	a. There are six simple devices, all over 3000 years old, which form the basis of our present day machines. b. Each of these devices has some characteristics which can be identified. c. Adaptations of these devices may be recognized in modern machinery

3. To establish a basic vocabulary needed to study and understand machines.	a. Develop the scientific concepts of work and power. b. Learn the units of measurement and solve simple problems in work and power.	a. Pushing and pulling do not constitute work. Force must be applied through a distance, or to cause motion, before work is done. b. A source of energy must be available to supply force. c. The amount of force available determines the time required to do a given amount of work. d. The term "power" indicates the rate of doing work, and derives from force, distance and time. e. Man has devised units of measurement to apply to all of these terms.
4. To establish and understand fully the principles which make machines of use to man.	a. Using experiments and demonstrations, illustrate the purposes for which machines are used. e.g. Inclined planes, pulleys, bicycles, etc. b. To develop the concept of mechanical advantage, establish and chart applied force, distance through which it is applied, and work done. c. Compare the mechanical advantages of various machines. d. Perform many calculations of problems relating to work, power and efficiency.	a. Machines may be used to do work; they are designed to utilize a limited force available, or to create changes in speed. b. Machines permit less force to act through a greater distance. c. The ratio of the distance through which force is applied to the distance though which the resistance moves is known as mechanical advantage. d. According to the purpose of the machine, M. A.'s both greater and less than 1 may indicate usefulness of the machine. e. Work output never equals work input. f. The term "efficiency" indicates what proportion of the work input is utilized by the machines to cause useful work output as intended.

5. To understand the basic principles and characteristics of three important types of engines which operate man's machines.		
(1) The Steam Engine	a. Review briefly the history and problems related to the development of steam power. b. Study methods of supplying steam to engines, and compare their efficiencies. c. Study the operation of the simple reciprocating steam engine. d. Trace the conversion of energy from fuel to work accomplished. e. Study the principles and design of the steam turbine.	a. The invention of the steam engine brought with it social problems as well as social progress. b. The conversion of energy from one form to another common to all engines, is accomplished in three steps in steam engines. c. Various types of machines operated by steam have been devised for such specific purposes, and to improve efficiency and mechanical operation. d. The steam turbine is well adapted to work requiring constant high speed.

(2) Internal Combustion Engines	a. Using models if possible, study thoroughly the operation of a four cycle engine. b. Review the chemistry of fuel as covered in Unit 5, and study the introduction and combustion of fuels in internal combustion engines. c. Study the special features of the diesel engine.	a. Internal combustion engines overcome certain disadvantages and limitations of steam engines. b. They use two new principles to convert energy to power. c. The various parts perform specific synchronized functions. d. Diesel engines utilize principles differing from those gasoline engines.
(3) Gas turbines, jets and rockets.	a. Discuss the principles, designs, and useful characteristics of gas turbines, jet engines, and rockets.	a. More recent developments of machines overcome limitations of earlier mankind. b. These three engines apply principles which have widened the horizons of man's achievement. c. Jets and rockets utilize the principle contained in Newton's third law.

6. To understand the basic principles of operation of one of man's most important applications of power from engines - airplanes.	a. Demonstrate the Bernoulli effect and show its relation to aircraft operation.	a. The relatively recent development of the airplane has revolutionized human association and endeavor.
	b. Show the significance of upward force on airplane wings as a factor in lift.	b. Modern airplanes are the result of man's development of better engines.
	c. Discuss aircraft design in relation to principles which make possible and which improve performace.	c. Bernoulli's principle is basic to the operation of heavier-than-air craft.
	d. Study the relationship between improved engines and aircraft design and performance.	d. Two component forces- the lift and the propeller thrust - operate to overcome the weight of the plane and the drag.
	e. Review and establish the principles basic to airplane control and navigation.	e. Four main controls direct the motion of the plane; four main instruments serve to make accurate navigation possible.

5. Summary of Activities

1. Collect a large number of specimens of matter for classification.
2. Make a compound from two elements.
3. Decompose a compound into elements.
4. Make a solution of a solid; obtain crystals.
5. Make a solution of a gas; boil a gas out of a solution.
6. Soften glass by heat.
7. Demonstrate Brownian movements.
8. Demonstrate cohesion and adhesion.
9. Weigh a sample of air.
10. Show that air exerts pressure.
11. Construct a mercury barometer.
12. Remove the oxygen from a sample of air.
13. Soften hard water.
14. Remove dirt from water by sedimentation and filtration.
15. Distill some salt water.
16. Decompose water by electrolysis.
17. Demonstrate the laws of liquid pressure.
18. Demonstrate Archimedes' principle and the principle of flotation.

DATE DUE SLIP

F255

QC 31 A315 1951
ALBERTA CURRICULUM BRANCH
PROGRAM OF STUDIES FOR THE
SENIOR HIGH SCHOOL
39841049 CURR HIST

000017747601

QC 31 A315 1951
Alberta. Curriculum Branch.
Program of studies for the
senior high school :
39841049 CURR HIST

CURRICULUM GUIDE

For Reference

NOT TO BE TAKEN FROM THIS ROOM

EXCEPT WITH LIBRARIAN'S PERMISSION